

RESPONSE AND REQUEST FOR RECONSIDERATION

Support.

Support for the selection of terephthalic acid or a salt thereof as component (a) is found in paragraph 0015. Support for component (b)(ii) in claim 17 being an aliphatic phosphorus ester is found in claim 1.

The language in claim 12 describing the ratio (a):(b) finds support in paragraph 0043.

No other elements of the claims have been amended.

Response.

The amendment to claim 12 should remove the rejection under 35 USC 112. It is now clarified that in determining the amount of component (b) in the ratio, the entire combination of inorganic phosphorus acid or salt and the aliphatic phosphorus ester are to be counted. Of course, if only one of these materials is present, it alone will be counted.

The Examiner had rejected claims 1, 9-11,13-14, and 26-27 as anticipated by **Rutkowski, US 3,974,081**. Rutkowski discloses a lubricant including dihexyl phthalate and phosphosulfurized terpene, a dispersant, and a lubricating base oil. However, Rutkowski does not disclose the use of terephthalic acid or a salt thereof. Accordingly, the present claims are not anticipated by Rutkowski.

Neither are the present claims made obvious by Rutkowski. Rutkowski employs the dihexyl phthalate as a seal swellant. There is no reason to believe that terephthalic acid or a salt thereof (having very different solubility and other properties than dihexyl phthalate) would be useful as a seal swellant. Thus there is no motivation to replace the dihexyl phthalate with terephthalic acid or a salt thereof.

The Examiner had rejected claims 1-4, 10, 12, and 15 as anticipated by **Lowe, US 5,088,587**. Lowe discloses a lubricant containing 0.1% terephthalic acid as well as tricresyl phosphate. However, Lowe's tricresyl phosphate is not an aliphatic phosphorus ester. Nor is the product of Example 1 in Lowe an aliphatic phosphorus ester. Accordingly, the claims are not anticipated by Lowe.

Neither are the claims made obvious by Lowe. There is no apparent reason for Lowe to exchange his tricresyl phosphate for a (generally more hydrophilic and polar) aliphatic phosphorus ester.

The examiner had also rejected various of the other claims, including certain dependent claims, as made obvious by various references or combinations of references. In general, the dependent claims, being narrower than the independent claims, will be novel and unobvious for the same reasons stated above. However, additional comments will be made with regard to these references and at least some of the claims.

The examiner had rejected claims 2-4, 7, and 17 as obvious over **Hotten, US 3,992,307**. Hotten discloses a composition consisting of oil, a succinimide dispersant, terephthalic acid, and zinc dihydrocarbyl dithiophosphate. Although the zinc dihydrocarbyl dithiophosphate is explicitly disqualified as the aliphatic phosphorus ester of (b)(ii), the examiner was of the opinion that it would have been obvious to substitute a dialkyl phosphate for the zinc dihydrocarbyldithiophosphate of Hotten.

The Applicants respectfully disagree that such a substitution would be obvious. From one perspective, the zinc dihydrocarbyldithiophosphate will serve as an antioxidant, along with the other added antioxidants, and since Hotten desires to have the best antioxidation performance possible, there is no motivation to omit that antioxidant component. In addition, however, the zinc dialkyldithiophosphate does not serve to impart solubility to the terephthalic acid of the present formulations, as does the present aliphatic phosphorus ester or inorganic phosphorus salt, so the person seeking to solubilize terephthalic acid would not look to the technology of Hotten.

The attached Declaration from Dr. Craig Tipton illustrates that terephthalic acid is not solubilized by zinc dialkyldithiophosphate or any of the other materials in Hotten's formulations, even upon heating. Dr. Tipton reports the results when Sample A and Sample B of Hotten were prepared and evaluated. Both samples contained 0.050 percent by weight terephthalic acid and 5.1 percent zinc dialkyldithiophosphate (including 11% diluent oil). The mixtures were heated to 80 °C and, in each instance, the solid terephthalic acid was insoluble. Samples of the mixtures were also stored for four weeks in the presence of steel, both at room temperature and at 65 °C. The solubility was evaluated after 1 week, 2 weeks, 3 weeks, and 4 weeks. In all instances, the storage stability was rated as "clear + light sediment," or in one instance "clear + trace sediment." The sediment was identified as terephthalic acid.

Thus, there is no suggestion in Hotten that the presence of zinc dialkyldithiophosphate imparts solubility to the terephthalic acid and no suggestion that use of the aliphatic phosphorus esters or the inorganic phosphorus acid or salt of the present invention would make any difference to that situation. There is no indication that the compositions of the present invention would impart solubility to the terephthalic acid when mixtures with zinc dialkyldithiophosphate do not. Thus, the present claims are not made obvious by Hotten.

Certain of the claims were also rejected as obvious over a combination of **Hotten** with **Suyama US 6,127,325**. With regard to claim 5, which specifies that both the phosphorus acid and aliphatic phosphorus ester are present, the Examiner notes that Suyama discloses that phosphoric acids are rust inhibitors. Since Hotten also includes a "standard rust inhibitor" in his formulations, the examiner believes that the combination would be obvious. However, as stated above, there is no aliphatic phosphorus ester (other than the

zinc dialkyldithiophosphate) present in Hotten and no suggestion that any such material should be present. There is no suggestion that the presence of either an aliphatic phosphorus ester or an inorganic phosphorus acid or both would serve to impart solubility to the terephthalic acid, which is in fact not soluble in the formulations of Hotten but is a feature of the present invention. Accordingly, claim 5 is not obvious.

With regard to claim 17, the Examiner stated that if the components of Hotten and Suyama were simply combined, a pre-reaction would occur and thus the method of claim 17 would therefore be obvious. The issue here relates to the motivation to combine the components of Hotten and Suyama to form a pre-reaction which is then mixed with an oil of lubricating viscosity in the presence of a dispersant. In the embodiment of the invention as set forth in claim 17, the order of mixing is significant. The terephthalic acid and the phosphorus compound or compounds are to be mixed together first, to form a concentrate, and thereafter the concentrate is mixed with the oil and dispersant. This is different from mixing the materials all together at once, since mixing in the desired order can permit the desired solubilization interaction to occur with the terephthalic acid before the presence of various other materials in the final formulation may reactively compete therewith. And since there is no teaching or suggestion in Hotten or Suyama that there is any particular interaction at all between the terephthalic acid and the phosphorus component, there is no motivation to facilitate any such interaction by selective pre-mixing. Accordingly, claim 17 is not obvious.

With regard to claim 28, there is no teaching, disclosure, or motivation in these references to use an aliphatic phosphorus ester rather than the aromatic esters of Hotten, in combination with the inorganic phosphorus ester of Suyama, with any indication that a homogenous mixture would ensue. Accordingly, claim 28 is not obvious.

The Examiner had rejected claim 8 as obvious over **Hotten** in view of **Hasegawa, US 6,153,118**. Hasegawa discloses dibutyl phosphite in a refrigerator compressor oil composition to improve wear resistance and load resistance. However, in view of the fact that the formulations of Hotten do not impart solubility to terephthalic acid, it is unexpected and unobvious that the use of any particular aliphatic phosphorus ester would do so. Accordingly, claim 8 is not obvious.

The Examiner has rejected claim 16 as unobvious over **Rutkowski** in combination with **Horodysky, US 4,522,734**. As stated above, Rutkowski discloses a lubricant including dihexyl phthalate, but, significantly, not terephthalic acid or a salt thereof. Horodysky discloses that certain borate esters are friction modifiers. However, Horodysky does not correct the deficiencies noted above in the Rutkowski reference and thus this combination of references does not render claim 16 obvious.

The Examiner has rejected certain of the claims, in particular, claim 17, a method claim, as made obvious by **Lowe** in view of either **Fetterman, US 5,320,765** or **Rutkowski**. Fetterman discloses the use of certain oil-soluble phenolic compounds as antioxidants. Among the scores of such compounds listed there is di[2-(3'-tert-butyl-2'-hydroxy-5'-methylbenzyl)6-tertbutyl-4-methyl phenyl]terephthalate. The examiner then speculates on a mechanism for solubilization of terephthalic acid, namely, esterification of the terephthalic acid by reaction with a phosphorus ester and concludes that the method claims are thereby made obvious.

It may be that the antioxidant ester compound of Fetterman is soluble. The present claims, however, do not specify esters, but rather terephthalic acid itself or a salt thereof. Terephthalic acid is extremely insoluble in oil. Moreover, the Examiner's suggested mechanism for solubilization of terephthalic acid is unsupported speculation based on an impermissible hindsight analysis. Nothing in the references suggests, before the fact, that terephthalic acid could or should be made soluble by treating it with an inorganic phosphorus acid or salt thereof or with certain aliphatic phosphorus esters, or that doing so would lead to an additive useful for imparting corrosion inhibition, as in the present invention. Finally, the esterification mechanism that the Examiner posits is inconsistent with the facts of the present invention. Applicants have found that the solubilization may be effected not only by an aliphatic phosphorus ester, but also by an inorganic phosphorus acid. The interaction with inorganic phosphorus acid could not lead to ester formation. Also, it is believed that it is predominantly the acid form of terephthalic acid, rather than the ester, that is active as a corrosion inhibitor in the present invention, so there would be no motivation to seek to prepare an ester in any event. Accordingly, the method claims are not made obvious by this combination of references.

Finally, the Examiner has rejected claims 19, 20, and 22 as made obvious by **Hotten** in view of **Suyama** and further either **Fetterman** or **Rutkowski**. The claims in question relate to details of conducting the claimed process. In view of the unobviousness of the main process claim 17, as discussed in detail above, it is submitted that these dependent claims are also unobvious and allowable.

Conclusion.

For the foregoing reasons it is submitted that the present claims are novel, unobvious and in condition for allowance. The foregoing remarks are believed to be a full and complete response to the outstanding office action. Therefore an early and favorable reconsideration is respectfully requested. If the Examiner believes that only minor issues remain to be resolved, a telephone call to the Undersigned is suggested.

Any required fees or any deficiency or overpayment in fees should be charged or credited to deposit account 12-2275 (The Lubrizol Corporation).

Respectfully submitted,

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